

Economics Report

French Meadows Restoration Project

Tahoe National Forest

American Ranger District

January 31, 2018

Prepared by

Robert Galliano, RPF # 2879

Forrester, Mason, Bruce & Girard Inc.

Introduction

The purpose of this report is to analyze the economic impacts of the 3 alternatives identified within the French Meadows Restoration Project EA. The three alternatives analyzed are alternative 1 – the proposed action, alternative 2 – no action, and alternative 3 – implement CSO interim guidelines.

AFFECTED ENVIRONMENT

The French Meadows Restoration Project is entirely located on the American River Ranger District in Placer County, California.

The population of Placer County is 382,387 as of 2017. Placer County residents reside in a mix of urban and rural settings. The main urban centers within the County are Roseville and Rocklin, which account for 52% of the population. The balance of the County residents reside in the smaller communities of Auburn, Colfax, Lincoln and Loomis, or in unincorporated County. Vegetation management actions on the American River Ranger District most influence communities of Auburn, Lincoln and Foresthill (included in unincorporated County).

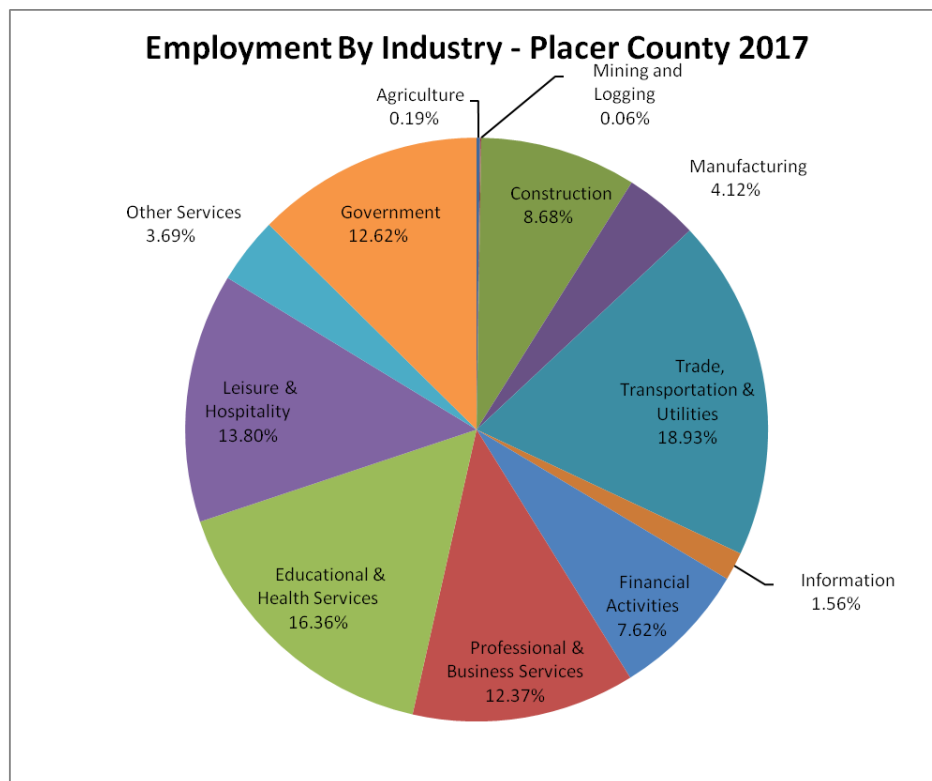
Activities on the American Ranger District contribute to the local economy in varying degrees, with the main contributors being timber harvesting, fuel reduction projects, recreational concessions, and grazing. In addition to completing projects which contribute to the local economy, the public relies on the Forest Service to implement projects to prevent potential negative impacts to the local economy, particularly to reduce the risk of large scale high intensity wildfire.

Placer County Employment Composition

Placer County employment for all industries was 160,000 jobs in 2016 based on available data obtained from the State of California Employment Development Department.

Figure 1 depicts the proportion each of the main industries in Placer County relative to the total employment. Within this total, the proportion of mining and logging is relatively low at .06%. This figure only represents a portion of the jobs related to forest vegetation management projects, as many of the related jobs fall into other sectors. Additional impacted sectors include professional and business services, manufacturing, trade, transportation, utilities, and government. Specific job titles within these broader sectors related to vegetation management include loggers, truckers, mechanics, mill workers, agricultural laborers, and other natural resources professionals (ex: foresters, biologists). Within rural portions of the county, forest management related employment makes up a greater proportion of the employment composition than what is reflected in the County data as a whole.

Figure 1: Employment Composition in Placer County



The Role of the Forest Service

Within Placer County, timber harvest has averaged 38,458 thousand board feet (mbf) per year for the period from 2007-2016 (harvest volumes for 2017 were not available at the time of this report). The public land timber harvest for the same period was 13,580 mbf. The U.S. Forest service is the primary contributor to the public timber harvested in the County.

Figure 2 shows the distribution of volume harvested per year. The fluctuation in volume harvested during the 10 year period is primarily due to the following factors:

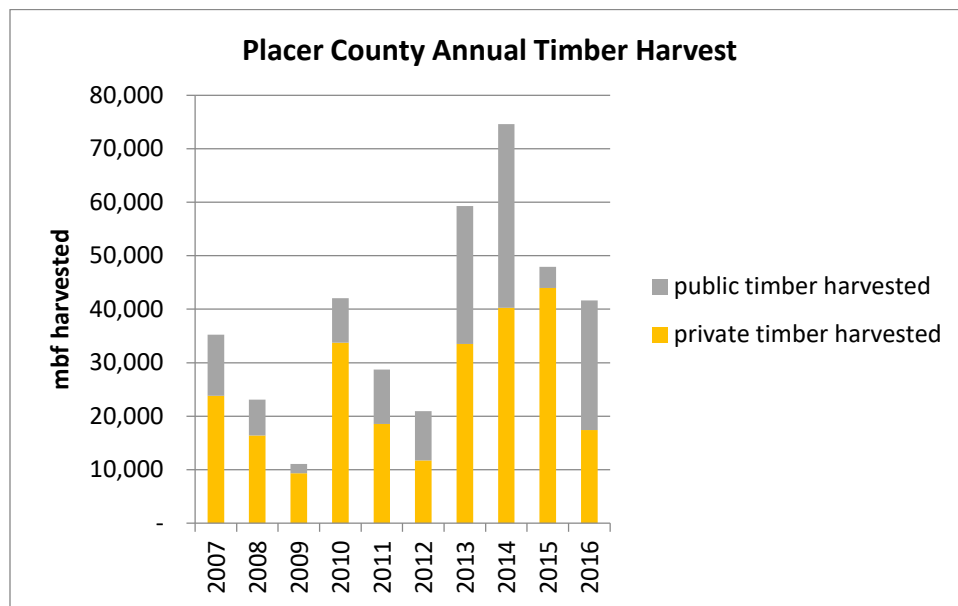
- 1) The economic recession caused a corresponding reduction in lumber demand from 2008-2009 resulting in less timber being harvested.
- 2) The 2013 American Fire and the 2014 King fire resulted in a substantial salvage logging effort on public and private lands from 2013-2016.

Payment to Placer County

The Secure Rural Schools and Community Self Determination Act (pub.L. 106-393) was passed into law by the United States Congress in October 2000. The law altered the formula for allocating payments to counties by giving them the option to receive a payment based on the average of the three highest payments received during the time period from fiscal year 1986 to fiscal year 1999. Prior to this law,

payments were governed by the Act of May 23, 1908 (35 Stat. 260; 16 U.S.C. 500), and section 13 of the Act of March 1, 1911 (36 Stat. 963; 16 U.S.C. 500) which allocated 25% of timber receipts to pay for roads and schools. The Secure Rural Schools and Community Self Determination Act expired September 30th 2017, and has not been reauthorized as of the date of this report. It is therefore assumed that Placer County would receive payments from this project based on the 1908 Act.

Figure 2: Annual Timber Harvest in Placer County



METHODOLOGY

In order to estimate volumes of material removed from the treatment stands, Forest Vegetation Simulator (FVS) was used to generate cubic foot and board foot volumes for each of the inventoried stands on a per acre basis. The inventory methodology is described in the forest vegetation specialist report.

For the purposes of estimating the costs of the French Meadows Restoration Project, the residual value approach was used. The analysis utilized the most recent Region 5 Transaction Evidence Appraisal data, with adjustments being made for local conditions and the difficulty of operations in the project area.

Assumptions

Factors affecting project feasibility include the value of forest products, the cost of extracting such products, cost of road construction and improvement, erosion control cost, and cost of non-commercial treatments. Costs associated with trail building and water research were not assessed as part of this analysis.

Forest product volumes: Stand examination data was utilized to estimate the harvest volume removed for sawtimber in thousand board feet (mbf), and biomass in bone dry tons (bdt). Harvest volumes are approximate, and totals represent the total estimated volume removed for the entire project.

Sawlog Value: The most recent Region 5 Transaction Evidence Appraisal (TEA) data indicates a weighted average delivered log price of \$397/mbf. This value was derived from the value assumptions shown in table 1, and harvest species composition shown in table 2.

Table 1 – TEA values by species and size class

Product	value in dollars per mbf
Ponderosa pine sawtimber 13-15 inches	180.00
Ponderosa pine sawtimber 16-24inches	265.00
Sugar Pine sawtimber 13-15 inches	180.00
Sugar Pine sawtimber 16-24 inches	356.00
Douglas-fir sawtimber – camp run*	478.33
Incense cedar sawtimber-camp run	492.67
White fir sawtimber – camp run	392.00

*camp run refers to timber which is sold on a single price per species

Using the values in table 1, a weighted average value of the expected species harvested for sawtimber was generated based on silvicultural observations made during walk through surveys and stand exam data collection. The percent of species harvested assumed for each sawtimber class was as follows:

Table 2 – Estimated harvest species and size class composition.

product class	percent of volume harvested
Ponderosa pine sawtimber 13"-15"	1%
Ponderosa pine sawtimber 16"-24"	1%
Sugar pine sawtimber 13"-15"	1%
Sugar pine sawtimber 16"-24"	1%
Douglas fir sawtimber – camp run	1%
Incense cedar sawtimber- camp run	10%
White fir sawtimber – camp run	85%

Biomass Value: The most recent region 5 Transaction Evidence Appraisal (TEA) and ATEA Base Period data indicates a delivered value for biomass of \$46.00 per bone dry ton (BDT). Recent projects on the Tahoe National Forest utilizing biomass from thinning operations have recovered an average of \$40.15

per BDT. The average from local projects was utilized for this analysis over the TEA assuming it better reflected local market conditions.

Logging Cost (stump to truck): Approximate stump to truck costs for sawtimber are estimated to be \$140/thousand board feet based on TEA Base Period Average Costs, and experience with similar projects on the American River Ranger District. The estimated stump to truck associated with this project is expected to be higher than typical due to implementing management requirements related to ground based equipment use on slopes over 30% and operations within watercourse buffers. The estimated stump to truck cost was increased to account for these increased costs.

Approximate stump to truck costs for non-sawtimber (biomass removal) are estimated to be \$100 per BDT for biomass. Biomass removal as the primary thinning treatment is uncommon on the American River Ranger District, so cost estimates were derived from literature review with adjustments made for site conditions. (Fight, Roger D. & Barbour, R. James. 2005., Springsteen, B et al. 2015, Bisson, Joel A, et al. 2014,)

Hauling Cost: Hauling cost was estimated by averaging the round trip haul time within the project area, multiplying that by the typical hourly rate of a log truck, and dividing this by the anticipated average load volume. This resulted in an estimated cost of \$165 per mbf for trucking (6 hours multiplied by \$110 per hour and divided by 4mbf per load). The same methodology was used to calculate the cost of hauling chips, resulting in an estimated cost of \$35.20 per bdt (6 hours multiplied by \$110 per hour divided by 17bdt per load).

In addition to the trucking, commercial log hauling requires payment of maintenance and surface replacement fees on some roads. The average distance hauled on fee roads for the project is approximately 37 miles. The fee rate is approximately \$1.4 per mbf per mile for sawlogs and \$0.56 per BDT per mile. Applying the road use fees to the project results in a cost of \$51.80 per mbf for logs and \$20.72 bdt for biomass. Adding the fee costs results in a total hauling cost of \$216.80 per mbf for hauling logs and \$55.92 per bdt for hauling biomass.

Road Construction/maintenance costs: In order to complete the commercial and non-commercial projects road rehabilitation, construction and maintenance activities need to occur. Road construction proposed in the project consists of short temporary spur roads. These roads occur on gentle topography, and would have minimal cost. This cost is accounted for in the stump to truck cost. Road repair and maintenance costs are variable depending on the particular road. Averages used for this analysis are \$2,000 per mile for light work, \$7,500 per mile for moderate work, and \$15,000 per mile for heavy work. The amount of road work required varies for each alternative. Light work requires vegetation removal adjacent to the road, grading of the road surface, and existing crossing maintenance. Moderate work requires vegetation removal adjacent to and on the road surface, existing crossing maintenance, some crossing reconstruction, and grading of the road. Heavy road work requires vegetation removal adjacent to and along most portion of the road surface, frequent repair of crossings, repair of severe gully on the road, and road grading.

Follow-up treatment costs:

Mechanical follow-up: Mechanical follow-up would involve either machine piling or mastication of small trees, logging slash, and residual surface fuels. Costs for machine piling and mastication are

comparable when considering the cost of burning machine piles. Cost for this treatment is expected to be approximately \$600/acre based on past projects on the American River Ranger District.

Follow-up prescribed burning: This practice would involve burning in units which have been previously treated by mechanical thinning, mastication thinning, or mastication release, with the majority of this practice being applied to mechanical thinned areas. Past projects using this practice on the American River Ranger District have had costs ranging from \$200 to \$600 per acre. Factors affecting the range of costs include access, unit size, ability of units to connect with natural topographical and vegetation breaks, and the amount of fire line construction needed. Due to the access which would be gained by the initial treatment and associated road work, a cost of \$300 per acre is expected for this practice.

Mastication Thin, Release Mastication: This practice would involve cutting and grinding of thinned trees and brush in addition to grinding of residual surface fuels. The cost for this practice is expected to range from \$700-\$1,200 per acre depending on slope and tree density. On average this practice is expected to cost \$700 per acre for planted stands and release mastication stands, and \$1,000 per acre for natural stands. This is based on recent projects on the American River Ranger District including Last Chance, End of the World, and Deadwood with upward adjustments made for site conditions found in the project area.

Prescribed Burning: The cost of prescribed fire is estimated to be \$700 per acre. Past prescribed fire projects on the American River Ranger District have ranged from \$200 to \$600 per acre. The cost for this project is projected to be more than past projects due to the need to construct extensive hand line, and the need to do some jackpot burning and hand thinning in some areas of the burn units.

Hand thinning and related slash work: Hand thinning and related lop and scatter or piling would cost on average about \$1,200 per acre based on similar projects on the American River Ranger District. The costs for individual sites would vary depending on slash treatment method with areas where slash is chipped being the most expensive and areas where slash is lopped being the least expensive.

Reforestation: Reforestation would involve a site preparation step, a planting step and a follow-up release step. Initial site prep could involve prescribed burning, mastication, or hand grubbing depending on amounts of vegetation re-growth at the time of implementation. Costs of site preparation or release are estimated to be \$450 per acre. The cost of planting is estimated to be \$150 per acre. This results in a total reforestation cost of \$1,050 per acre including the site preparation, planting and release steps. Cost estimates are based on past experience on the American River Ranger District.

Rust Resistant Sugar Pine, Meadow, Aspen and Cottonwood Restoration: These practices would occur during thinning of adjacent units. Costs to complete these practices are built into the larger unit costs.

Direct Employment: Various publications have documented the relationship between amount of volume harvested and direct employment in logging and forest product manufacturing. Estimated ratios vary between 6 and 11 year-long, full-time jobs per million board feet (Laaksonen-Craig S, G Goldman, and W McKillop. 2003, Warren, Debra D. 2011, Crone, Lisa K; Haynes, Richard W. 2001.) For this analysis, the assumption of 7 jobs per million board feet is used. In order to determine the employment created by service work, the dollar figure for this work was divided by the average rate per hour which would be charged for that work. For work not involving heavy equipment (non-mechanized work), an average

rate of \$50 per hour was assumed. For work involving heavy equipment (mechanized work), a rate of \$110 per hour was assumed.

Employment “Multiplier” Effects: As people work within a manufacturing sector such as producing forest products, an incremental demand for goods and services occurs in other sectors, creating additional jobs outside the primary manufacturing sector. A recent study of economic contributions of the forestry sector in the North Coast region of California found employment multipliers ranging from 1.69 to 2.93. (Henderson et al. 2016). The average of the range was 2.28, and therefore 2.28 is used as the indirect multiplier for this project.

PROJECT ECONOMIC ANALYSIS

Alternative 1, Proposed Action

The economic analysis for Alternative 1 is discussed with regard to 1) implementation costs, 2) volume of forest products removed, 3) direct employment, 4) indirect employment through the multiplier effect. Timber sale viability is often assessed for vegetation management projects on National Forest Land. This project is expected to be implemented through a stewardship contract with Placer County, and not to be offered as a timber sale. Forest products may be removed from the project, which would offset some of the costs of the non-commercial treatments, but this offset would be far less than the cost of the project.

Implementation Costs

Using the Methodology described in previous sections, the costs for the treatments are summarized in Table 3. The estimated revenues are indicated in Table 4. Subtracting the estimated revenue from the estimated cost results in a net implementation cost for Alternative 1 of \$9,521,625.95

Table 3 – Alternative 1 Implementation Costs

Treatment costs - alternative 1				
practice	units	unit type	cost per unit	total cost
Hand Thin	476	acres	\$1,200.00	\$571,521.43
Mastication Thin Natural	366	acres	\$1,000.00	\$366,490.76
Mastication Thin Plantation	655	acres	\$700.00	\$458,423.75
Release Mastication	410	acres	\$700.00	\$287,343.28
Reforestation	102	acres	\$1,050.00	\$106,677.61
Prescribed Understory Burning	6205	acres	\$700.00	\$4,343,501.54
Mechanical Follow-up	3148	acres	\$600.00	\$1,888,914.49
Prescribed Fire Follow-up	1061	acres	\$300.00	\$318,152.28
Mechanical Thin - Sawtimber removal	8402	mbf	\$356.80	\$2,997,833.60
Mechanical Thin & Small Trees Mechanical Thin- Biomass Removal	7040	bdm	\$155.93	\$1,097,747.20
Road Work*	assessed as part of transportation plan			\$492,070.00
			total	\$12,928,675.95

Table 4 – Alternative 1 Forest Product Revenue

Forest Product Revenue	units	unit type	revenue per unit	revenue
Sawlogs	8402	mbf	397	\$3,335,594.00
Biomass	7040	bdm	10.15	\$71,456.00
			total	\$3,407,050.00
			net project cost	\$9,521,625.95

Direct and Indirect Employment

In Alternative 1, it is expected that 59 year-long jobs would be created from the sawtimber removal. With the multiplier effect added, 134 year-long jobs would be created. Biomass removal was assessed as non-commercial work, as no studies relating units of material removed to jobs could be identified. The total direct employment for mechanized non-commercial work is 20 year-long jobs. The total direct employment for non-mechanized work is 51 jobs. Both of these figures assume 2,087 hours worked per year. Applying the employment multiplier results in 162 year-long jobs being created for non-commercial work. Adding the sawtimber removal jobs and the non-commercial work jobs results in a total of 284 year-long jobs being created by Alternative 1.

Table 5 – Alternative 1 Employment Summary

Activity	Year Long Jobs Created	Year Long Jobs Created with Multiplier Effect
Sawtimber removal	59	134
Non-commercial work	71	162
Total Jobs Created		296

Alternative 2, No Action

Under Alternative 2 no activities would occur and therefore no money would be spent on the project. Correspondingly, no jobs would be created associated with the project. No action, applied over the larger landscape results in a cumulative effect of reducing capacity to complete forest restoration projects in the local area, and therefore undermines the ability for projects to be completed in the future.

Alternative 3, Interim Recommendations Alternative

Using the same methodology as Alternative 1, the costs for the treatments identified in Alternative 3 are summarized in Table 6. The estimated revenues are indicated in Table 7. Subtracting the estimated revenue from the estimated cost results in a net implementation cost for Alternative 3 of \$10,387,795.02

Table 6 – Alternative 3 Implementation Costs

Treatment costs - alternative 2				
practice	units	unit type	cost per unit	total cost
Hand Thin	1449	acres	\$1,200.00	\$1,739,368.55
Mastication Thin Natural	358	acres	\$1,000.00	\$358,052.64
Mastication Thin Plantation	597	acres	\$700.00	\$417,698.53
Release Mastication	410	acres	\$700.00	\$287,343.31
Reforestation	102	acres	\$1,050.00	\$106,677.62
Prescribed Understory Burning	7872	acres	\$700.00	\$5,510,399.38
Mechanical Follow-up	1092	acres	\$600.00	\$655,117.26
Prescribed Fire Follow-up	517	acres	\$300.00	\$155,098.08
Mechanical Thin - Sawtimber removal	3395	mbf	\$356.80	\$1,211,336.00
Mechanical Thin & Small Trees Mechanical Thin- Biomass Removal	5510	bdm	\$155.93	\$859,174.30
Road Work*	assessed as part of transportation plan			\$491,270.84
			total	\$11,791,536.52

Table 7– Alternative 3 Forest Product Revenue

Forest Product Revenue	units	unit type	revenue per unit	revenue
Sawlogs	3395	mbf	397	\$1,347,815.00
Biomass	5510	bdm	10.15	\$55,926.50
			total	\$1,403,741.50
net project cost				\$10,387,795.02

Direct and Indirect Employment

In Alternative 3, it is expected that 24 year-long jobs would be created from the sawtimber removal. With the multiplier effect added, 54 year-long jobs would be created. The total direct employment for mechanized non-commercial work is 13 year-long jobs. The total direct employment for non-mechanized work is 72 jobs. Applying the employment multiplier results in 194 year-long jobs being created for non-commercial work. Adding the sawtimber removal jobs and the non-commercial work jobs results in a total of 248 year-long jobs being created by Alternative 3.

Table 8 – Alternative 3 Employment Summary

Activity	Year Long Jobs Created	Year Long Jobs Created with Multiplier Effect
Sawtimber removal	24	54
Non-commercial work	85	194
Total Jobs Created		248

Summary and Comparison of Effects

This analysis quantifies the economic benefit that the French Meadows Restoration Project would have on the local economy in terms of jobs created related to timber harvest and non-commercial restoration work, along with the cost for each alternative.

The French Meadows Restoration Project is unique in that it proposes to treat areas which are inherently economically challenging. Factors which make operations particularly costly include the following:

- 1) Long haul distances to the nearest log processing facility in combination with long distances which must be traveled on roads requiring payment of road use fees.
- 2) The majority of timber harvested would be true firs, which have a relatively low log value.
- 3) Many of the mechanical thinning stands are near the minimum canopy cover thresholds under the Forest Plan Standards and Guidelines for Mechanical Thinning Treatments (Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD) 2004, pp. 50 through 51). This results in a relatively low volume per acre of merchantable timber harvestable, which increases harvest costs and decreases revenue which could be used to offset project costs.
- 4) There is a high proportion of non-commercial work relative to the amount of commercial treatments where sale of forest products would offset costs.

Given these challenges the project is not expected to generate revenues near the amount which would offset the project costs, but rather would rely on grant funding from a diverse range of public and private sources to fund implementation.

The proposed action (Alternative 1) generates approximately 16% more jobs than Alternative 3 and produces nearly 2.5 times the forest products (sawtimber and biomass) as alternative 3. Another difference between the two action alternatives is that Alternative 1 would involve a higher treatment intensity than Alternative 3, which would result in the effectiveness of the treatments persisting on the landscape for a longer period of time. Because Alternative 1 would remain effective on the landscape for a longer period of time than Alternative 3, it is more economically efficient and therefore preferred in economic terms. Should log prices improve prior to implementation of the project, the degree that Alternative 1 becomes more economically efficient would increase.

Alternative 2 (no action) would not result in any direct costs or direct economic benefit. Alternative 2 would not address the purpose and need of the project, and the resulting stands would continue to be

at high risk to high intensity, stand replacing wildfire and/or insect and disease epidemics. Should either of these conditions occur in the project area the economic loss in terms of damage to biological resources, water infrastructure, and recreational infrastructure would far exceed the cost of the project.

In summary, the proposed action (Alternative 1) is the most cost-effective alternative taking into consideration duration of treatment effectiveness and the potential costs of no action.

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